

REMARKS

The statements by the Examiner that claims 6-11, 13-14, 17, 21, 25, 27 and 28 contain allowable subject matter are gratefully acknowledged. Claims 1, 16 and 18 have been amended. Claims 1-32 are pending in the application. Applicant reserves the right to pursue the original claims and other claims in this and other applications.

Claims 1-14 and 31 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 has been amended as suggested in the Office Action. The concerns raised in the Office Action have been addressed by the amendment of claim 1. Applicant respectfully requests that the rejection of these claims be withdrawn and the claims allowed.

Claims 15, 16, and 26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Carroll et al. (US 6,160,578). This rejection is respectfully traversed.

Claim 15 recites an image sensor comprising, *inter alia*, "first and second A/D converters ... having staggered operating timing, such that one of the A/D converters starts operating when a different A/D converter is continuing to operate" (emphasis added). Claim 26 recites a method comprising the acts of "A/D converting pixel values ... in a first A/D converter, at a first timing; and A/D converting pixel values ... in a second A/D converter at a second timing offset from said first timing" (emphasis added). Applicant respectfully submits that Carroll et al. does not disclose these limitations.

Carroll et al., by contrast, discloses "the CLK signal needed by each of A/Ds 22' and 23' may be slightly out of phase with each other, as might the CLK-not signals used with A/Ds 22'' and 23''. Additionally, each CLK-not signal for A/Ds 22'' and 23'' may

not be exactly 180° out of phase with the corresponding CLK signal needed for A/D 22' and 23', respectively." Col. 9, ln. 56-63. That is, the A/D converters of Carroll et al. are configured to be either exactly in phase, or exactly 180° out of phase, with each other ensuring that all A/Ds are either on or off simultaneously, with no staggered overlap of operating times as is recited in claims 15 and 26.

Since Carroll et al. does not disclose all the limitations of claims 15 and 26, claims 15 and 26 are not anticipated by Carroll et al. Claim 16 depends from claim 15 and is patentable at least for the reasons mentioned above and on its own merits. Applicant respectfully requests that the 35 U.S.C. § 102(b) rejection of claims 15, 16, and 26 be withdrawn and the claims allowed.

Claims 18-19, 22-23, 29, and 32 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Pain et al. ("A Low-Power Digital Camera-on-a-Chip Implemented in CMOS Active Pixel Approach," IEEE International Conference on VLSI Design, Jan. 1999). This rejection is respectfully traversed.

Claim 18 recites an image sensor comprising, *inter alia*, "timing and control logic, having a plurality of control parts, said plurality of control parts individually controllable and turned off when not in use" (emphasis added). Claim 29 recites a method of acquiring an image comprising the act of "turning off ... bias electrical signals at times during the acquiring when the biases are not needed" (emphasis added). Applicant respectfully submits that Pain et al. does not teach or suggest these limitations.

Pain et al. discloses that "[l]ow average power is achieved by temporarily turning off tail currents in circuit blocks with no activity.... [C]urrent flows only through those source followers that belong to the selected row.... [C]urrent flow occurs

only for a fraction ... of the row time. The digital control logic power is negligible."

Page 4, section 4 (emphasis added). The Office Action interprets the circuit blocks to be control parts, however, it is clear from Pain et al. that the circuit blocks are the pixel rows, and not the digital control logic or any control parts. Although the digital control logic power is negligible in Pain et al., it is not turned off, as recited in claim 18. Further, Pain fails to disclose the programmable bias generation circuits (DACs) being turned off at any time, much less turning off bias electrical signals when not needed as recited in claim 29.

Since Pain et al. does not disclose all the limitations of claims 18 and 29, claims 18 and 29 are not anticipated by Pain et al. Claims 19 and 22-23 depend from claim 18 and are patentable at least for the reasons mentioned above and on their own merits. Claim 32 depends from claim 29 and is patentable at least for the reasons mentioned above and on its own merits. Applicant respectfully requests that the 35 U.S.C. § 102(b) rejection of claims 18-19, 22-23, 29, and 32 be withdrawn and the claims allowed.

Claims 1-4, 12, and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pain et al. in view of Shaw et al. (US 6,606,122). This rejection is respectfully traversed.

In order to establish a *prima facie* case of obviousness "the prior art reference (or references when combined) must teach or suggest all the claim limitations." M.P.E.P. §2142. Neither Pain et al. nor Shaw et al., even when considered in combination, teach or suggest all limitations of independent claim 1.

Claim 1 recites, *inter alia*, an image sensor, comprising "a column readout part ...; a gain stage ...; and an output driving stage ..., wherein each of said column readout part, said gain stage, and said output driving stage include at least one element

which optimizes a power consumption of the stage independent of other stages" (emphasis added). Applicant respectfully submits that Pain et al. does not teach or suggest this limitation. Instead, Pain et al. teaches that "[l]ow average power is achieved by temporarily turning off tail currents in circuit blocks with no activity.... [C]urrent flows only through those source followers that belong to the selected row.... [C]urrent flow occurs only for a fraction ... of the row time. The digital control logic power is negligible." Page 4, section 4 (emphasis added). Pain et al. further teaches that "to minimize ADC power, bit times ... are binary-scaled, since the equivalent capacitance ... reduces exponentially in successive cycles." *Id.* There is no power optimization of a gain stage, and therefore, there is no independent power optimization of each of a column readout part, a gain stage, and an output driving stage as recited in claim 1.

Nor is Shaw et al. cited for this limitation. Shaw teaches "[t]he voltage value VREF is produced by one of the on-chip DACs; changing this value alters the dynamic range and thus the gain of the A to D converter." Col. 10, ln. 62-65. There is no optimization of power for the gain stage. Thus, Shaw et al. does not remedy the deficiency of Pain et al.

Nor does Shaw et al. teach or suggest how to modify Pain et al. to obtain the claimed invention. There is therefore no *prima facie* case of obviousness. Obviousness is based on factual findings. "Whether a patent claim is obvious under section 103 depends upon the answer to several factual questions and how the factual answers meld into the legal conclusion of obviousness *vel non*." *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351 (Fed. Cir. 2001). The four underlying factual inquiries are: (1) the scope and content of the prior art; (2) the differences between the claims and the prior

art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of non-obviousness. *Graham v. John Deere Co.*, 393 U.S. 1, 17-18 (1966).

There is no motivation to combine all of these references to obtain the invention of claim 1. Motivation or suggestion to combine or modify prior art references “must be clear and particular, and it must be supported by actual evidence.” *Teleflex, Inc. v. Ficosa North America Corp.*, 299 F.3d 1313, 1334 (Fed. Cir. 2002). Because the “genius of invention is often a combination of known elements which in hindsight seems preordained,” the Federal Circuit requires a “rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.” *McGinley*, 262, F.3d at 1351. Yet there is no teaching or suggestion within any of the references that provide a motivation to combine them.

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680 (Fed. Cir. 1990). Thus, a showing of an obvious combination requires more than just an amalgam of references, each of which provides one feature of the claimed invention.

The Office Action has done no more than cite a group of references, each of which provides one feature of the claimed invention, and allege that their combination renders the invention obvious. However, without the benefit of hindsight, there would have been no motivation to combine these references and the Office Action has failed to provide proof of any such motivation.

Since Pain et al. and Shaw et al., even when combined, do not teach or suggest all of the limitations of claim 1, claim 1 and dependent claims 2-4, 12, and 31 are not

obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 1-4, 12, and 31 be withdrawn and the claims allowed.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Pain et al. in view of Shaw et al., and further in view of Guerrieri et al. (US 6,233,012). This rejection is respectfully traversed. Claim 5 depends from claim 1 and is patentable at least for the reasons mentioned above and on its own merits. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claim 5 be withdrawn and the claim allowed.

Claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Pain et al. in view of Guerrieri et al. This rejection is respectfully traversed. Claim 20 depends from claim 18 and is patentable at least for the reasons mentioned above and on its own merits. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claim 20 be withdrawn and the claim allowed.

Claim 24 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Pain et al. This rejection is respectfully traversed. Claim 24 depends from claim 18 and is patentable at least for the reasons mentioned above and on its own merits. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claim 24 be withdrawn and the claim allowed.

Claim 30 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Pain et al. in view of Mangelsdorf (US 6,018,364). This rejection is respectfully traversed. Claim 30 depends from claim 29 and is patentable at least for the reasons mentioned above and on its own merits. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claim 30 be withdrawn and the claim allowed.

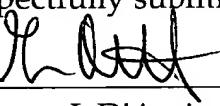
Claims 6-11 and 13-14 stand objected to as being dependent upon a rejected base claim, but are otherwise allowable. Claims 17, 21, 25, and 27-28 stand objected to as being dependent upon a rejected base claim, but are otherwise allowable. Claims 6-11, 13-14, 17, 21, 25, and 27-28 depend, respectively from claims 1, 15, 18, and 26, which are believed to be allowable for at least the reasons set forth above. Applicant respectfully submits that claims 6-11, 13-14, 17, 21, 25 and 27-28 are allowable for at least the same reasons and on their own merits.

Claims 1 and 18 have been amended to include carriage returns between elements of the claims in order to improve their readability. Claim 16 has been amended to correct typographical errors.

In view of the above amendment, Applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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